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U. S. DEPARTMENT OF AGRICULTURE.

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H. W. WILEY, Chief of Bureau.

AMERICAN WINES AT THE PARIS EXPOSITION OF 1900:

THEIR COMPOSITION AND CHARACTER.

BY

H. W. WILEY,

Chief of the Bureau of Chemistry.

WITH

A MONOGRAPH ON THE MANUFACTURE OF WINES IN CALIFORNIA.

BY

HENRY LACHMAN,

Of San Francisco, Cal.



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LETTER OF TRANSMITTAL.

U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF CHEMISTRY,
Washington, D. C., July 31, 1902.

SIR: I have the honor to submit herewith, for your inspection and approval, the manuscript of an article describing the composition of the wines of American origin made by wine makers to whom awards were given at the Paris Exposition of 1900, together with a monograph on the manufacture of wines in California. I recommend that this manuscript be published as Bulletin No. 72 of the Bureau of Chemistry.

Respectfully,

H. W. WILEY,
Chief of Bureau.

Hon. JAMES WILSON,
Secretary of Agriculture.

INTRODUCTION.

The importance of the relation of agriculture to wine making is continually increasing in the United States. There are large areas of our country where the environment—meaning by this term the soil and climate together—is suitable to the growth of the vine. In fact, by careful attention vineyards can be successfully established in almost every part of the country. There are, however, some especial portions of the United States which have shown unusual advantages for grape culture. In the eastern part of the country these localities are found in Virginia and New York, in the central Northern States in Ohio, in the south in Florida, and in the West in California; in fact, the chief part of the viticultural interests in the United States is found in California, so that often in speaking of American wines California wines are understood by implication to be meant.

An attempt was made to send typical samples of wines from the various regions mentioned above to the Paris Exposition. The collection and preparation of these samples for the exhibit were confided to the Chief of the Bureau of Chemistry, who was also made the representative of the United States on the jury appointed to judge the character of the wines exhibited. The importance of this exhibit was so great as to render advisable a more extended study of the wine industry, and to this end duplicate samples of most of the wines exhibited were secured for analysis.

It is now well established that the character of a wine depends solely upon its chemical composition. It is further established that this character depends, first, upon the constitution of the grape itself, and second, upon the changes to which the grape juices are subjected in passing from the fresh state to that of the finished wine. These changes are wholly of a chemical nature, and are induced chiefly by certain chemical reagents known as ferments. The character of the fermentation depends upon the nature of the ferments and the environment to which they are subjected; in other words, what is known in making wines as the cellar treatment.

We have been fortunate in securing the collaboration of Mr. Henry Lachman, a wine expert of the highest ability, in furnishing a description of the cellar methods employed in California, where the wine

makers have learned by experience what cellar methods will give the best results in that particular environment. The high temperatures which often prevail during the fermenting season in California produce, perhaps, the most disturbing influence of any part of the environment upon the fermentation. Hence the character of the fermentation, the speed with which it is accomplished, and the methods of controlling it are all different from those which exist in older countries where wine is made. Mr. Lachman is admirably equipped to study these methods, and his description of them is a welcome addition to our knowledge of the fermentation of grape juices.

The action of the jury in refusing to grant awards to certain American wines, bearing upon the labels names of foreign origin, opens a question of grave consideration for our wine makers. While the representative of the United States on the jury protested against what he considered the injustice of the action of the jury, the wisdom of the use of such labels is extremely doubtful. It is to be hoped that, as a result of this complication, our wine makers will be led to exclude, eventually, from their labels any name which could have any influence whatever in misleading the purchaser of a wine in regard to its identity or character. The names of our own wines, established by their real merits, would be a sufficient advertisement to extend their consumption, not only to all parts of our own country, but even, as is now the case, to other countries. It is a remarkable fact that American wines are largely replacing other wines in the London markets, and their qualities of strength, color, and purity have commended them to wine makers and consumers throughout the world. It is not claimed that in this country we have yet had the experience and the skill to produce wines of the highest type, but we do produce wines of excellent qualities and of undoubted purity and wholesomeness.

H. W. WILEY,
Chief of Bureau.

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AMERICAN WINES AT THE PARIS EXPOSITION OF 1900: THEIR CHEMICAL COMPOSITION AND CHARACTER.

By H. W. WILEY,
Chief of the Bureau of Chemistry.

Through the combined efforts of the viticulturists in different parts of the United States, and especially through the collaboration of the California Paris Exposition commission of 1900, a representative collection of wines was made, under the direction of the Chief of the Bureau of Chemistry, for the Paris Exposition of 1900. This work was authorized by the Secretary of Agriculture, through Mr. Charles Richards Dodge, the representative of the U. S. Department of Agriculture for the Exposition.

On the recommendation of the California commission, Mr. W. H. McNeill, of San Francisco, was appointed to collect the typical wines from the Pacific coast, and a similar office was performed for the eastern and northern portions of our country by Maj. Hezekiah Gardner, of Hammondsport, N. Y., since deceased. Valuable assistance in the collection of wines from the southern portions of the country was rendered by Mr. E. Dubois.

Unfortunately, at the time of the transmission of these wines to Washington for preparation for shipment to Paris some of them were subjected to low temperatures, sufficient in one instance to congeal the contents of the bottles. Some of the packages were thus broken, and all of the congealed wines were of course rendered unfit for exhibition and were withdrawn from competition. With the exception of these packages, the wines all reached Washington in good condition and were not materially injured by transportation to Paris.

Owing to delay in fitting the cases and to other unavoidable circumstances, the wines were about the last of the agricultural exhibits which were installed, the complete installation not being finished until about the 1st of June, after the examination of the wines had commenced. The wines which were sent for exhibition were catalogued as follows:

American wines exhibited at the Paris Exposition, 1900.

Exhibitor.	Locality.	Variety.
Adams, A. P., & Co.....	Lind vineyard, Fresno, Cal	Natural iron port.
Baldwin, C. A	West Side, Santa Clara, Cal	Muscat, Port; Brandy, 1886; Brandy, 1892.
Barton Estate Co	Fresno, Cal	Grey Riesling, 1887; Grey Riesling, 1889; Grey Riesling, 1892; Cabernet, Burgundy.
Ben Lomond Wine Co.....	Ben Lomond vineyard, Santa Cruz, Cal.	Riesling, 1895; Riesling, 1896; Sherry, 1893; Angelica, 1893; Zinfandel, 1896; Carignan, 1895; Port, 1893; Brandy, 1890; Brandy, 1892.
Beringer Bros	Los Hermanos vineyard, St. Helena, Cal.	

American wines exhibited at the Paris Exposition, 1900—Continued.

Exhibitor.	Locality.	Variety.
Boettcher, H.....	Los Angeles, Cal.....	Muscat, Port, Brandy.
Brotherhood Wine Co.....	New York	Sparkling wine: Le Grand Monarque, brut.
California Wine Association.....	San Francisco, Cal.....	Haut Sauterne, Sauterne, Riesling, Hock, Zinfandel, Claret, La Loma, Cabernet, Hillcrest, Cabernet Sauvignon, Burgundy, F. O. B. port, Port, Sherry, Tokay, Madeira, Muscat, Angelica, Malaga.
California Winery Co.....	Sacramento, Cal	Port, 1890; Port, 1895; Sherry, 1890; Sherry, 1895; Sauterne, Riesling, Claret.
Chaix & Bernard.....	San Francisco, Cal.....	Riesling, Zinfandel.
Crellin, Louis.....	Ruby Hill vineyard, Pleasanton, Cal.	Hock, Riesling, Claret, Cabernet, Burgundy.
Dewey & Sons, H. T.....	New York	Burgundy, Sauterne, Moselle, Norton's claret, Port, Angelica, Ives claret, Ruby claret, Sweet catawba, Unfermented grape juice.
Duval, A	Chateau Bellevue vineyard, Livermore, Cal.	Sauterne.
Eisen Vineyard.....	Fresno, Cal.....	Port, Sherry.
Empire State Wine Co.....	Penn Yan, N. Y.....	Sparkling wine (State Seal); Still wines (sweet and dry).
Engels & Krudwig Wine Co.....	Sandusky, Ohio	Norton's Virginia, Delaware, Dry catawba.
Finke's (A.) Widow	San Francisco, Cal	Sparkling wine (Widow Finke brut, Nonpareil sec.)
Florida Brandy Distilling Co.....	Tallahassee, Fla.....	Grape brandy, Pear brandy, Blackberry brandy, White wine (Hock type).
Garrett & Co.....	Weldon, N. C.....	Scuppernong, Blackberry.
Germain Wine Co.....	Los Angeles, Cal.....	Angelica, Port, Sherry.
Germania Wine Cellars Co.....	Hammondsport and Rheims, N. Y.	Sparkling wine (Excelsior, Grand, Imperial sec.), Still wine, Brandy.
Gier Co., Theodore	Oakland, Cal	Sauterne, Johannisburg, Cabernet, Burgundy, Zinfandel.
Grierson, Oldham & Co.....	San Francisco, Cal	Chablis, Sauterne, Hock, Claret, Burgundy, Zinfandel, Angelica, Muscat, Port, Sherry, Tokay, Brandy (black grape, Folis Blanche).
Guasti, Secondo	Los Angeles, Cal.....	Port, Sherry, Muscat, Malaga.
Gundlach-Bundschu Wine Co.....	Bacchus vineyards, Sonoma, Cal.	Cabinet traminer, Madeira, Chablis, Sauterne, Chateau Gundlach, Cabernet, Chambertin, Muscatel, Claret (Huichica), Port, Malaga, Sherry, Tokay, Cognac brandy, 1888; Cognac brandy, 1897.
Gunn, Jas, O'B	Windsor, Cal	Johannisburg, Zinfandel.
Hammond, Chas. Mifflin	Ma Tel vineyard, Upper Lake, Cal.	Semillon, Mataro, Cabernet Sauvignon, Brandy.
Hastings estate	La Jota vineyard, Angwin, Cal.	Blanco, Colorado.
Heney, Richard, jr.....	Chateau Ricardo vineyard, Cupertino, Cal.	Golden dry sauterne, Chateau Ricardo.
Hoelscher & Co., Wm	San Francisco, Cal	Burgundy, Medoc, Sauterne, Zinfandel, Riesling, Cabernet
Hommel, M.....	Sandusky, Ohio	Sparkling wine (White Star, Extra Dry).
Italian-Swiss Agricultural Colony.	Asti, Cal	Pinot blanc, Riesling, Gedel, Chablis, Chateau d'Asti (red, white), Barolo, Mataro, Port, Muscatel, Monte Cristo, Johannisburg, Sauterne, Barbera, Chianti, Zinfandel, Angelica, Marsalo, Burgundy, Crignolino, Sherry, Brandy.
Keyes, W. S	Liparita vineyard, Angwin, Cal.	Blanco, Colorado.
Klein, Pierre	Mira Valle vineyard, Mountain View, Cal.	Claret (1893 Grand wine, 1892,), Sauterne.
Koster, Jno. L.....	Mount Hamilton vineyard, San Jose, Cal.	Riesling, Sauterne, Burgundy, Medoc, Cabernet.
Lake Keuka Wine Co.....	Hammondsport, N. Y	Sparkling wine (Club Special, Brut).
Malta, Geo, H.....	St. George vineyard, Fresno, Cal.	Sauterne, Claret, Angelica, Muscat, Port, Sherry.
Mann, C. M	Santa Rosa, Cal	Chablis, Haut-sauterne, Burgundy, Chateau Yquem, Cabernet, Zinfandel, Brandy.

American wines exhibited at the Paris Exposition, 1900—Continued.

Exhibitor.	Locality.	Variety.
Masson, Paul	San José, Cal	Sauterne, Burgundy, Sparkling wine (dry, sweet).
Monticello Wine Co.....	Charlottesville, Va	Virginia Delaware, Virginia claret, Norton's Virginia Seedling.
New Hammondsport Wine Co ..	Hammondsport, N. Y	Sparkling wine (Golden Age, Brut).
Palmtag, Wm.....	Palmtag's vineyard, Hollister, Cal.	Riesling, Johannisburg riesling, Sauterne, Cabernet, Angelica, Sherry, Port, Brandy.
Pleasant Valley Wine Co.....	Rheims, N. Y	Sparkling wine (Great Western).
Repsold, A., & Co.....	San Francisco, Cal	Riesling, Sauterne, Burgundy, Montecito, Cabernet, Crème de Sauterne, Brandy.
St. Hubert Wine Co	do	Tonic port.
San Luis Vineyard	Tallahassee, Fla	Sauterne, Haut sauterne, Chateau San Luis claret, Florida hock, Port, Orange wine, Wild-cherry cordial, La Floridienne, brandy (grape, pear, blackberry).
Schilling, C., & Co.....	San Francisco, Cal	Beclan, Claret, Riesling, Port, Sherry, Zinfandel, Semillon, Angelica, Muscat.
Schram, Jacob	Schramberger vineyard, St. Helena, Cal.	Hock, Riesling, Sauvignon, Claret, Burgundy, Zinfandel.
Sierra Madre Vintage Co	Lamanda, Los Angeles County, Cal.	Port, Sherry, Muscatel, Angelica.
Smith, Julius Paul.....	Olivina vineyard, Livermore, Cal.	Sparkling wine (the Pride of California).
Sormano, G	Los Angeles, Cal	Port, Muscat, Sherry, Brandy.
Southern California Wine Co.....	do	Claret, Angelica, Port, Orange wine, Brandy.
To-Kalon Wine Co	Washington, D. C	Claret, Burgundy, Riesling, Sauterne.
Urbana Wine Co.....	Urbana, N. Y	Sparkling wine (Gold Seal).
Vina Vineyard and Distilling Co	Vina, Cal	Brandy.
Wehner, Wm	Lomas Azules vineyard, Evergreen, Cal.	Haut sauterne, Claret.
Wetmore-Bowen Co	Cresta Blanca vineyards, Livermore, Cal.	Cresta Blanca souvenir wines (Sauterne, Haut sauterne, Chateau Yquem, St. Julien, Margaux)
Woolacutt, H. J	Los Angeles, Cal	Sauvignon vert, Port Angelica, Orange wine, Muscatel, Brandy.
Xander, Christian	Washington, D. C	Claret, Norton, Va.; Port, Pride of Virginia; Melliston wild-cherry cordial, Aromatic bitters.

INTERNATIONAL WINE JURY AT THE PARIS EXPOSITION, 1900.

The wine jury was the largest connected with the Exposition and consisted of 81 jurors and 20 suppléants. Of these, 24 represented foreign countries and 77 represented France. The American member of the jury for wines was H. W. Wiley, and the suppléant, L. J. Vance. The wine jury was organized the latter part of May with the following officers:

President, M. Gustave Kester.

Vice-President, Leon, Prince Galitzine.

Reporter, M. Paul Le Sourd.

Secretary, M. Raoul Chandon de Briailles.

The jury work was continued without intermission from the latter part of May to the latter part of August, before the final examinations were completed. The wines were not examined in the Exposition building, but in the large wine-testing room of the entrepôt Saint-Bernard, situated on the Seine, opposite the Place Jussieu. In this large room, furnished with many tables, the jury could work in

groups. Usually five members of the jury were assigned to each group, so that, as a rule, twenty groups would be working at the same time. The judgment of each group, in all cases, was final, unless some appeal should be taken to a larger part of the jury. The hours for gustation were from 9 to 12 of each working day, and each group would usually complete within this time fifty samples of wine.

The wines were judged upon a scale of numbers, of which 20 was the highest. Samples reaching 19 and 20 were entitled to the grand prix; all wines from 16 to 18, inclusive, received a gold medal; all from 12 to 15, inclusive, a silver medal; all from 9 to 11, inclusive, a bronze medal, and all from 6 to 8, inclusive, honorable mention.

In all there were some 36,000 different samples of wines to be tested by the jury, and this accounts for the long duration of the examination. Even if all twenty groups into which the jury was divided had met every day and each group examined fifty samples, it would have required thirty-six working days to complete the task. In point of fact, however, there was always a certain percentage of absentees, so that it was only on rare occasions that as many as twenty groups were working at the same time, and for this reason the examination lasted much longer than the possible period in which it could have been completed.

Before proceeding with an account of the awards given to the American wines, it is advisable to call attention to an incident which occurred in connection with the examination which delayed for a considerable period the examination of the American wines and nearly caused their entire withdrawal from competition.

Early in June the writer applied to M. Kester, the president of the jury, to set a date for the examination of the American wines, in order that they might be properly prepared beforehand and put into proper conditions of temperature and clearness for the inspection of the judges. The 19th of June was finally decided upon as the date at which the examination of the American wines would begin. As it was not expected that more than one group of the jury would work upon these wines, the number under examination indicated that it would take about two days for the completion of the examination. The name of the manufacturer or vineyard was on each label, the locality of the vineyard was mentioned, the State or Territory in which the wine was manufactured was usually given, and, in most cases, the date of vintage. Each label, therefore, was clear and distinct in regard to the character of the wine, the country in which it was made, and the name and place of manufacture. It is true that many of the samples offered for examination bore upon the label names similar to those of like wines made in foreign countries, especially in France.

All the wines from the United States were submitted to the commissioner-general of the Exposition and accepted by him for exposi-

tion. No exception was taken by the French administration to the labels which these wines bore, nor was any attempt made by the United States commission to introduce the wine under any false pretenses, or bearing any other label than that placed by the manufacturers themselves upon the bottles.

On June 18, with the assistance of Mr. E. Dubois, all of the American still wines were prepared for examination. They were placed upon the tables in the hall where the examination of wines was conducted, properly grouped, and each group accompanied with a description of the wines and the magnitude of the industry furnished by the makers. On the morning of June 19, when the jury assembled and was about to begin its work, they were called into the assembly room of the jury, and after some discussion the following resolution was proposed:

In the year 1900, the 19th of June, the international jury of Class 60, assembled under the presidency of Mr. Kester, having been consulted as to the expediency of giving its opinion on the subject of the inspection of French or of foreign products which would be presented to that body with a false indication of origin, has decided unanimously:^a

That the wines or grape brandies from France or from foreign countries with labels affixed bearing a false indication of origin shall not be examined, and consequently not compete for awards.

With unanimity,^a the jury further expressed the wish that the samples of said products to be found in the different sections of the Exposition Universelle of 1900 be withdrawn from the installation in the name of fair play and in the interest of the consumers, the producers, and the wine merchants of all the viticultural regions.

GUSTAVE KESTER, *President.*

PAUL LE SOURD, *Rapporteur.*

RAOUL CHANDON, *Secrétaire.*

Before this resolution was submitted to a vote the juror for the United States protested to the jury against the legality of passing a resolution of this kind. The sentiment, however, was so unanimously in favor of it that there was not a dissenting vote recorded on its final passage, inasmuch as it seemed inadvisable to go on record as voting in the negative as opposed to the whole jury. The views in opposition to this measure were presented, by request, by Mr. E. Dubois, who, by reason of his French nativity, was enabled to present the matter in the French language in a most satisfactory manner.

This unexpected move on the part of the jury placed the juror from the United States in a most embarrassing position, as the adoption of this resolution practically excluded from competition a large number of wines from the United States. Immediate action, however, was necessary, and so permission was asked to withdraw temporarily the whole exhibit of American wines from examination. This was accorded, and the wines which had already been placed upon the tables for examina-

^aThis is an error. Dr. Wiley, although present, abstained from voting on the resolution.

tion were returned to the cellars. Immediately there was prepared and filed with Mr. Charles Richards Dodge, the representative of the Department, for transmission to the Hon. F. W. Peck, the commissioner-general from the United States, a protest against the action of the jury, couched in the following terms:

I have the honor to make the following report concerning the action of the jury of Class 60 in connection with the American wine exhibit:

On the 18th of June I asked permission of the president of the jury, Mr. Kester, to proceed with the examination of the American wines, and he informed me that the examination would begin on the morning of the 19th, if it met with my convenience, and would continue until finished, which would probably require two days. The sparkling wines, however, were excluded from this examination, as it was stated that they would be examined about the 4th of July in connection with the sparkling wines of other countries. I immediately proceeded to prepare the sweet wines and the brandies for examination, and was assisted in this work by Mr. Dubois, of Florida, whom I found was very helpful and exceedingly well posted in all matters relating to wines. By hard work we succeeded in getting the exhibit ready, and at half past 9 this morning we were ready to begin the examination. At this time a messenger informed us that the president wished to meet all the members of the jury in the jury room. On repairing to this room the president announced that he had been informed that a large number of wines were exhibited under false names or names indicating standard varieties of wines. He called attention to the resolution of the Viticulture Congress, passed last Friday, asking that the exhibition of all such wines be suppressed and that they be refused admission to competition. The president suggested that the jury formally adopt this opinion, and this suggestion seemed to meet with universal favor.

At this point I interposed and asked permission to explain the use of certain words, such as Sauterne, Burgundy, Chablis, and similar expressions denoting typical kinds of wines, showing that no intention to deceive or defraud was shown, nor did the label in any way deceive or defraud the purchaser, and that each label of American wines plainly showed their origin, the vineyard from which they were taken, and the name and address of the maker. This explanation, however, did not satisfy the members of the jury, and when the resolution was put to a vote it was carried unanimously. I did not care to be the only one voting against it, and so abstained from voting altogether.

I further said that the time to object to these labels was when the wines were offered for exposition, and not at the last moment, when the wines were already installed and the samples to be judged on the tables ready for the work of the jury to begin. I further called attention to the fact that at former expositions American wines had been exhibited under the identical names they now bear and had received the highest awards—in many cases, gold medals—and no objection to the labels had ever been made. This was denied by several members of the jury, among others the secretary, who said it was impossible that such a thing could have happened. The official records of former expositions show, however, that my statement was correct.

Since by the above resolution a number of the wines which had been prepared for examination would be rejected, I considered that the only dignified thing to do was to ask permission of the president to withdraw the wines for the present until I could consult with the American authorities. To this the president of the jury consented, and the wines were sent to the cellar. I have consulted with the members of the California commission with regard to the matter and they agree to the proposal which I now make, namely, that the commissioner-general be requested

to inform the French authorities that the American wines are withdrawn from competition, and, further, that a separate jury be appointed by the commissioner-general of the United States to examine the American wines and award such premiums as may be found suitable.

H. W. WILEY,
Juror for the United States, Class 60.

The above protest gains strength when it is remembered that at the Exposition of 1889 practically the same wines bearing the same labels were admitted to examination and award and a great many medals were given them, as will be found by consulting the names of the exhibitors in the Official Catalogue of the Exposition of 1889, pages 205 to 209, inclusive.

This protest was presented by Mr. Dodge to the American commissioner-general, and by him was forwarded to the French commissioner-general. After about three weeks the protest bore fruit in securing another meeting of the jury, when the former action was rescinded by a practically unanimous vote, and in place of the resolution above quoted the following was adopted, namely:

That wines bearing labels or names denoting any false origin be admitted to examination and marking, but that the jury give no recompense for these wines, but deposit the markings given them with the president of the jury for such subsequent use as may be deemed desirable.

In view of the fact that the first objectionable resolution had been rescinded, it was now asked that the examination of the American wines be continued, and this was done with the following results, which are here republished:

List of exhibitors at the Paris Exposition who received awards.

GOLD MEDALS.

1. California Wine Association, San Francisco, Cal.
2. Pierre Klein, Mountainview, Cal.
3. San Luis Vineyard, Tallahassee, Fla.
4. Sierra Madre Vintage Company, Lamanda, Cal.
5. W. S. Keyes, Liparita Vineyard, Angwin, Cal.
6. Pleasant Valley Wine Company, Rheims, N. Y.

SILVER MEDALS.

1. C. A. Baldwin, West Side, Cal.
2. California Winery Company, Sacramento, Cal.
3. Garrett & Co., Weldon, N. C.
4. Theodore Gier Company, Oakland, Cal.
5. Grierson, Oldham & Co., San Francisco, Cal.
6. Guasti Secondo, Los Angeles, Cal.
7. Richard Heney, jr., Cupertino, Cal.
8. M. Hommel, Sandusky, Ohio.
9. Italian Swiss Agricultural Colony, Asti, Cal.
10. Urbana Wine Company, Urbana, N. Y.
11. Engels and Krudwig Wine Company, Sandusky, Ohio.
12. William Palmtag, Hollister, Cal.
13. Julius Paul Smith, Livermore, Cal.

BRONZE MEDALS.

1. Beringer Brothers, Los Hermanos Vineyard, St. Helena, Cal.
2. Brotherhood Wine Company, 332 Spring street, New York City.
3. Chaix & Bernard, San Francisco, Cal.
4. Cuesta Francisco.^a
5. H. T. Dewey & Son, 138 Fulton street, New York City.
6. Empire State Wine Company, Penn Yan, N. Y.
7. German Wine Company, Los Angeles, Cal.
8. Germania Wine Cellars, Hammondsport, N. Y.
9. Gundlach Bundschu Wine Company, Sonoma, Cal.
10. J. O'B. Gunn, Windsor, Cal.
11. Charles Hammond, Upperalake, Cal.
12. Hastings Estate, Angwin, Cal.
13. Leland Stanford's Vina Vineyard.^a
14. Monticello Wine Company, Charlottesville, Va.
15. Repsold Company, San Francisco, Cal.
16. To-Kalon Wine Company, Washington, D. C.
17. Ch. Xander, Washington, D. C.

HONORABLE MENTION.

1. Ben Lomond Wine Company, Santa Cruz, Cal.
2. Paul Masson, San Jose, Cal.
3. Southern California Wine Company, Los Angeles, Cal.
4. H. J. Woolacutt, Los Angeles, Cal.

In further explanation of the French names appearing upon our wines, especially upon those from California, attention must be called particularly to the fact that these names are used only to indicate the type of the wines. Especially in the case of the Cresta Blanca vineyard, the word "Souvenir" is uniformly employed in connection with the French name. It seems hard to find a reasonable objection to the use of a foreign name with such a restriction or limitation. In California the grapes of the Rhine, the grapes of the Gironde, and the grapes of Burgundy are grown. These different varieties of grapes produce different kinds of wine, more or less similar to those of the districts in the old country from which the grapes respectively came. Very often two or three distinct types of white wine are made by the same grower from different varieties of grapes planted in such location and soil as are best adapted to each variety. From cabernet, merlot, malbec, and verdot he will produce a wine of the red Bordeaux type, often superior to the article produced from the same grapes in many districts of the Gironde; from pinot, petite-sirrah, etc., a wine of Burgundy type; from the riesling, traminer burger, etc., a wine similar to the wine of the Rhine. Has not the vinedresser the right to present these different wines to the public under the name of their prototypes, provided their American origin is not concealed or rendered doubtful? He may give each a special name, but that

^aNo address now obtainable.

name is not descriptive of the class or type of wine; moreover, he may have some just claim upon the name of the kind of wine known to the trade and the public as the type that this special product of his most resembles.

In many places in other countries wines are manufactured in imitation of sherry, Burgundy port, port, malaga, etc., and shipped as such; in Bordeaux, Spanish, or other foreign wines or blends of same with French wines, are shipped to foreign countries under names clearly indicating French origin, and the fact that they are shipped from Bordeaux with the name of a Bordeaux firm (true or fictitious) on the label or on the barrel gives the product a convincing stamp of genuineness and origin. Not only is the use of foreign names practiced in other countries, but the blended products bearing those names are recognized by the trade.

While it seems, from the above exposition of the facts of the case, that the jury was scarcely to be justified in excluding American wines from competition because they bore on any part of the label a French name, the action of the jury should call strongly to the attention of our wine growers the desirability of cutting loose entirely from foreign names and establishing the character of our own brands. While it may be true that at the beginning of a business the use of a name well-established may serve to call attention to a new wine and to secure its introduction, it is nevertheless true that any lasting merit which any brand may deserve will depend upon the character of the wine and not upon the name it bears. It is of course understood that in no case should any foreign name be used in any manner calculated to deceive the consumer. For this reason it is earnestly suggested to our American wine makers that all foreign names be dropped in so far as is possible. If, however, it is deemed absolutely necessary to use a foreign name it should be accompanied with the word "type," "souvenir," or some such qualifying term as will clearly indicate the meaning intended. There are so many excellent wines now produced in this country that there seems to be no longer any reason for the use of a foreign name, if any such reason ever really existed. It can not, therefore, be too strongly urged that our wine makers drop at once and forever the use of all names of foreign origin, and establish the merits of their brands on new and distinctly American names.

Fortunately, none of the sparkling wines exhibited from the United States bore the name "champagne" on any part of the label, so that they were not excluded from examination under the final action of the jury. Some of our sparkling wines, however, were objected to by members of the jury by reason of the color and general appearance of the label and the capping. It must be admitted that many of our makers of sparkling wines have adopted a label and capping which are very close imitations of those used in foreign countries. This

practice seems also to be reprehensible, and while not technically a violation of the principle on which the French jury acted, it is a violation of that principle in spirit. Hence, to avoid every appearance of trying to sail under false colors, it certainly would be praiseworthy for the makers of our wines everywhere not only to drop every indication on the label of any foreign name, but also to avoid in the general appearance of the label and the capping any imitation of any foreign wine of established reputation.

Fortunately, the increasing skill of our wine makers, better knowledge of agriculture as applied to vine growing, and improved processes of vinification have made for American wines types which need no adventitious advertising or labeling to secure their introduction and appreciation among our people. It is not to be expected that in so young an industry and in an environment so different from that of Europe we should reach in a short time the perfection of skill which the European wine makers have acquired by centuries of study and practice. There must remain for many years varieties of foreign wines which for excellence, delicacy, and bouquet are superior to those which we manufacture. Nevertheless, it must be admitted that the American wines for ordinary consumption, for purity, soundness, brightness, color, taste, and bouquet, are equal if not superior to the ordinary wines consumed abroad.

CHEMICAL COMPOSITION OF THE AMERICAN WINES RECEIVING AWARDS.

The wines which were offered for exhibition at Paris came to Washington in packages ready for reshipment. To have opened these packages and withdrawn samples for analysis would have required the entire repacking of the whole consignment. It was deemed advisable, therefore, not to break the packages, since the chief point to be secured was the transportation of the samples to Paris in prime condition. Only the samples which had been frozen in transit were withdrawn, and all the others were sent forward in the unbroken packages in which they reached Washington.

Modern science has added much to the skill and success of vinification. Many of the schools of viticulture study from a scientific point of view all the steps in agriculture devoted to grape growing and to the manufacture of wines. Many large vineyards now employ special chemists to control fermentation and ripening, and the data of the laboratory have become quite as important in judging a wine as the taste of the connoisseur. It has been established beyond peradventure that the soundness, the purity, the delicacy, and the bouquet of a wine depend almost solely upon its chemical composition. Bad fermentation is at once shown in the character and quantity of the acids and other products remaining in the wines. When these faults of composition

are pointed out, the remedies for preventing them are at once suggested. The skilled chemist has therefore become an indispensable aid to the wine maker.

In order that the chemical composition of the types of wine exhibited at Paris might be shown in connection with the other data relating to the exposition, duplicate samples were secured, so far as possible, from the proprietors of the brands which received awards. These samples have been carefully examined under the direction of W. D. Bigelow, chief of the Food Laboratory of this Bureau, the chemists making the several determinations being as follows:

W. D. Bigelow, glycerol; L. M. Tolman, specific gravity, alcohol, tartaric acid, polarization, and sulphurous acid; J. D. Burd, extract, ash, potassium sulphate, phosphoric acid, and tannin; L. S. Munson, reducing sugars, total and volatile acids; T. C. Trescot, nitrogen. The data obtained are found in the following tables:

Description of some American wines made by wine makers receiving awards at Paris, 1900.^a

Serial number.	Description.	Manufacturer.
SPARKLING WINES.		
715	State Seal, Special Dry	Empire State Wine Co., Penn Yan, N. Y.
716	Le Grand Monarque Brut	Brotherhood Wine Co., New York City.
717	Great Western	Pleasant Valley Wine Co., Rheims, N. Y.
718	Grand Imperial Brut	Germania Wine Cellars, Hammondsport, N. Y.
719	Grand Imperial Sec	Do.
721	Hommel's Extra Dry	M. Hommel, Sandusky, Ohio.
722	White Star	Do.
768	Extra Dry	Paul Masson, San Jose, Cal.
793	Sparkling Moscato	Italian-Swiss Colony, San Francisco, Cal. Vineyards, Asti and Madera.
BRANDIES.		
732	Old Brandy	Sierra Madre Vintage Co., Lamanda, Cal.
731	Blackberry Brandy	Garrett & Co., Weldon, N. C., and St. Louis, Mo.
DRY WHITE WINES.		
707	Riesling <i>b</i>	Wm. Palmtag, Hollister, Cal.
747	Johannisberger <i>b</i>	Theo. Gier Co., Oakland, Cal.; vineyard, Livermore, Cal.
748	Haut Sauterne, Pride of Livermore, <i>b</i>	Do.
754	Riesling <i>b</i>	C. Schilling & Co., San Francisco, Cal.
760	Grey Riesling <i>b</i>	Ben Lomond Wine Co., Ben Lomond, Santa Cruz County, Cal.
750	Sauterne <i>b</i>	Mira Valle, P. Klein, proprietor, San Francisco, Cal.; vineyard, Cupertino, Cal.
761	Golden Dry Sauterne <i>b</i>	Chateau Ricardo (Heneys'), Cupertino, Cal.
789	Sauterne <i>b</i>	Italian-Swiss Colony, San Francisco, Cal.; vineyards, Asti and Madera, Cal.
741	Blanco	Hastings estate, La Jota Vineyard Co., Angwin, Cal.
743do.....	W. S. Keyes, Liparita, Angwin, Napa County, Cal.
742	Amarillo	Do.
755	Semillon	C. Schilling & Co., San Francisco, Cal.
846	White Semillon	Ma Tel, Chas. Mifflin Hammond, proprietor, Upper Lake, Lake County, Cal.
790	Chablis	Italian-Swiss Colony, San Francisco, Cal.; vineyards, Asti and Madera, Cal.
729	Florida Hock (Old Vintage)	San Luis Vineyard, Tallahassee, Fla.

^a A number of the wine makers receiving awards are not mentioned in this list owing to failure to send samples for analysis. The omission of the analyses of wines of the California Wine Association, due to miscarriage of samples, is especially regretted.

^b Excluded from award by reason of bearing names of foreign origin, but marked, as explained in text.

Description of some American wines made by wine makers receiving awards at Paris, 1900—Continued.

Serial number.	Description.	Manufacturer.
DRY RED WINES.		
705	Ruby Claret.....	H. T. Dewey & Sons Co., 138 Fulton street, New York City; cellars, Egg Harbor, N. J.
706	Norton's Claret.....	Do.
710	Norton's Virginia Seedling	Robt. Portner's Annaburg Vineyard, Manassas, Va.; Chris. Xander, proprietor, Washington, D. C.
726	Virginia Claret.....	Monticello Wine Co., Charlottesville, Va.
727	Norton's Virginia	Do.
728	Chateau San Luis Claret	San Luis Vineyard, Tallahassee, Fla.
753	Claret	C. Schilling & Co., San Francisco, Cal.
749do	Mira Valle, P. Klein, proprietor, San Francisco, Cal.; vineyard, Cupertino, Cal.
746	Cabernet, Pride of Livermore	Theo. Gier Co., Oakland, Cal.; vineyard, Livermore, Cal.
847	Cabernet Sauvignon and Carignan	Ma Tel, Chas. Mifflin Hammond, proprietor, Upper Lake, Lake County, Cal.
739	Colorado	Hastings estate, La Jota Vineyard Co., Angwin, Napa County, Cal.
740do	W. S. Keyes, Liparita, Angwin, Napa County, Cal.
751	Grand Wine	Mira Valle, P. Klein, proprietor, San Francisco, Cal.; vineyard, Cupertino, Cal.
752	Beclan	C. Schilling & Co., San Francisco, Cal.
762	Chateau Ricardo	Richard Heney, Jr., Cupertino, Cal.
791	Barolo	Italian-Swiss Colony, Asti, Sonoma County, Cal.
794	Tipo Chianti ^a	Do.
745	Zinfandel	Theo. Gier Co., Oakland, Cal.; vineyard, Livermore, Cal.
709do	Chaix & Bernard, San Francisco, Cal.
845	Mataro and Zinfandel	Ma Tel, Chas. Mifflin Hammond, proprietor, Upper Lake, Lake County, Cal.
744	Burgundy ^a	Theo. Gier Co., Oakland, Cal.; vineyard, Livermore, Cal.
792	Asti Burgundy ^a	Italian-Swiss Colony, San Francisco, Cal.; vineyards, Asti and Madera.
SWEET WHITE WINES. ^b		
714	Catawba	Empire State Wine Co., Penn Yan, N. Y.
737	Old Angelica	Sierra Madre Vintage Co., Lamanda, Los Angeles County, Cal.
758	Choice Old Angelica	C. Schilling & Co., San Francisco, Cal.
738	Old Sherry ^a	Sierra Madre Vintage Co., Lamanda, Los Angeles County, Cal.
756	Sherry ^a	C. Schilling & Co., San Francisco, Cal.
708	Muscated	Wm. Palmtag, Hollister, Cal.
733	Old Muscat	Sierra Madre Vintage Co., Lamanda, Los Angeles County, Cal.
759	Choice Old Muscat	C. Schilling & Co., San Francisco, Cal.
730	Escapernong	Garrett & Co., Weldon, N. C.
SWEET RED WINES. ^a		
704	Good Samaritan Port	Southern California Wine Co., Los Angeles, Cal.
711	Pride of Virginia Port	Chris. Xander, Washington, D. C.
713	Vineyard Queen Old Port	Empire State Wine Co., Penn Yan, N. Y.
731	Old Malvoisie Port	Sierra Madre Vintage Co., Lamanda, Los Angeles County, Cal.
735	Trousseau Port	Do.
736	Old Port	Do.
757	Port	C. Schilling & Co., Los Angeles, Cal.
848	Mataro ^b	Ma Tel, Chas. Mifflin Hammond, proprietor, Upper Lake, Lake County, Cal.
712	Port	Edward Germain, Los Angeles, Cal.

^a Excluded from award by reason of bearing names of foreign origin, but marked, as explained in text.

^b Transferred from Class 60, wines, to Class 61, cordials, etc.

NOTE.—The wines of the Cresta Blanca vineyard were examined by the jury and received a mark entitling the exhibitors to a gold medal. The medal was not awarded because the labels bore the names "Sauterne Souvenir," etc.

Chemical analyses of American wines made by wine makers receiving awards at Paris, 1900.

SPARKLING WINES.

Seretal number.	Specific gravity at 15.30.	Alcohol by volume.	Glycerol.	Glycerol-alcohol ratio.	Extract.	Ash.	Total acids.	Volatile acids.	Total tarratic acid.	Free tarratic acid.	Volatile acids.	Polarization.	Reducing sugars.	Potassium sulphate.	Phosphate acid.	Total sulphurous acids.	Tannin.	Undetermined ex-
715	1.0010	13.40	10.63	100 cc.	Gr. per 100 cc.	Gr. per 100 cc.	Gr. per 100 cc.	Gr. per 100 cc.	Gr. per 100 cc.	Gr. per 100 cc.	Gr. per 100 cc.	Gr.	Gr.	Gr.	Gr.	Gr.	Gr.	
716	1.0020	12.30	9.76	100 cc.	5.00	1.14	1: 1	8.5	5.38	0.19	0.357	0.141	1: 13	60	b- 5.4	3.88	0.070	0.016
717	1.0012	13.79	10.87	100 cc.	4.65	.157	1: 10	8	.783	.715	.054	.320	1: 14	50	b- 2.8	3.586	.176	0.013
718	1.0012	11.65	9.25	5.106	5.63	.128	1: 16	7	.635	.598	.076	.280	1: 9.0	3.9	b- 3.9	.698	.014	0.016
719	1.0013	12.05	9.56	.5900	6.94	.137	1: 16	7	.596	.596	.005	.319	1: 10	0.4	b- 8.0	.584	.222	0.015
720	1.0013	12.05	12.06	.2549	8.56	.114	1: 30	1	.618	.580	.054	.331	1: 12	0.0	b- 8.0	.228	.018	0.023
721	1.0013	9.990	12.06	.2501	11.07	.151	1: 16	8	.639	.521	.094	.205	1: 0.15	1.8	b- 6.78	.154	.016	.11
722	1.0013	12.95	11.07	4.33	1.21	1: 16	1	.601	.552	.119	.163	None	1: 5.0	a- 1.8	.289	.154	.009	
723	1.0013	13.65	10.35	.4876	1.78	.171	1: 10	4	.622	.522	.060	.229	1: 0.06	1.8	b- 1.8	.023	.195	.016
724	1.0013	13.60	10.79	.3788	7.02	.290	1: 10	4	.603	.418	.148	.234	None	1: 7.4	b- 1.8	.023	.1.04	.023
725	1.0013	13.60	10.79	.3788	7.02	.290	1: 10	4	.603	.418	.148	.234	None	1: 4.07	b- 13.3	.140	.023	.056
726	1.0013	13.60	10.79	.3788	7.02	.290	1: 10	4	.603	.418	.148	.234	None	1: 4.07	b- 13.3	.140	.023	.056

a Temperature of polarization, 25.4° C.

b Temperature of polarization 900 °C

BRANDIES.

	a_{14}	s_{14}	r_{14}	c_{14}	const.
732	.9407	.48,.35			
731	1.0804	18,.35	14,.56	.6466	

u 14.88 per cent cane sugar; invert reading -24.82 at 25.4° C.

Chemical analyses of American wines made by wine makers receiving awards at Paris, 1900—Continued.

DRY WHITE WINES.

Central number.	Specific gravity at 15°/50.	Alcohol by volume.	Glycerol.	Glycerol-alcohol ratio.	Extract.	AS _H .	Extract-asphalt ratio.	Total acids.	Fixed acids.	Volatile acids.	Total tartaric acid.	Free tartaric acid.	Potassium sulphate.	Phosphoric acid.	Total sulphurous acids.	Tannin.	Determined ex-	Undetermined.	
707	0.9925	11.76	9.29	6654	7.5:100	1: 9.1	2.26	1: 8.7	.558	.431	.101	.117	1:3.83	1:1.1	0.75	0.008	0.0058	0.409	
717	.9918	10.11	6.817	6.7:100	1.96	1: 9.1	.241	1: 6.7	.613	.497	.093	.160	None	1:5.50	.051	.140	.009	.59	
751	.9909	12.75	10.03	1.0119	9.5:100	2.51	.270	1: 9.3	.715	.501	.171	.039	None	1:6.62	—	.328	.151	.046	
760	.9920	13.90	10.59	6.834	6.5:100	2.20	.198	1:11.1	.658	.570	.070	.352	1:9.37	—	.076	.291	.119	.65	
750	.9911	13.35	10.59	6.5:100	2.20	.180	1:13.0	.607	.475	.106	.292	.1785	1:5.75	—	.142	.235	.090	.68	
761	.9917	13.75	10.91	9.188	8.4:100	2.38	.226	1: 9.2	.698	.528	.136	.194	0.450	1:5.12	—	.058	.109	.077	.71
789	.9928	12.50	9.92	5.690	5.7:100	2.09	.355	1:11.1	.535	.417	.095	.152	1:5.65	—	.064	.122	.087	.427	
711	.9913	11.95	9.48	7.260	7.7:100	1.78	.160	1:10.5	.489	.392	.077	.137	.0574	1:6.31	—	.139	.112	.075	.41
743	.9914	11.50	9.13	6.610	7.2:100	1.72	.160	1:10.5	.489	.392	.077	.119	0.0142	1:6.31	—	.079	.151	.074	.37
712	.9912	11.50	9.13	6.248	6.8:100	1.60	.501	1: 9.7	.501	.466	.079	.220	1.137	1:7.15	—	.071	.060	.071	.28
755	.9923	10.90	8.65	6.959	8.0:100	1.64	.190	1: 8.6	.565	.466	.079	.273	0.016	1:9.88	+	.116	.116	.026	.22
846	.9901	14.25	11.31	6.441	5.7:100	2.11	.172	1:12.3	.498	.435	.050	.220	0.012	1:6.41	—	.142	.133	.013	.74
790	.9939	10.60	8.41	6.110	7.3:100	1.85	.222	1: 8.2	.672	.541	.104	.220	0.012	1:5.04	—	.319	.186	.127	.34
729	.9916	12.40	9.84	5.812	5.9:100	1.97	.107	1:16.4	.433	.326	.086	.200	0.012	1:5.04	—	.319	.186	.0018	.64

a Determined in ash.

DRY RED WINES.

705	.9939	12.55	9.96	6.416	6.1:100	2.24	0.204	1:10.7	.682	.560	0.098	.252	.0468	1:6.97	0.00	.153	Lost.	0.059	0.024	0.1459	0.68
706	.9931	11.87	9.40	5.505	5.8:100	2.47	.200	1:12.2	.753	.634	0.095	.212	.0468	1:7.90	0.00	.129	0.077	.082	.027	.2670	...
710	.9930	15.40	12.22	9.501	7.8:100	2.80	.338	1: 6.5	.823	.526	0.238	.111	None	1:3.46	—	.200	.091	.084	.026	.2634	...
726	.9958	13.05	10.35	6.123	5.9:100	2.89	.275	1:10.2	.829	.683	0.197	.141	None	1:4.92	—	.192	.074	.065	.026	.2485	1.13
727	.9963	13.40	10.63	.610	5.8:100	3.22	.393	1: 8.0	.901	.568	0.266	.083	1:3.38	—	.0280	.084	.065	.030	.2741	1.37	
728	.9955	10.95	8.69	7.023	8.1:100	2.39	.173	1:13.8	.541	.424	0.091	.172	None	1:5.78	—	.193	.093	.165	.086	.038	2.7539
733	.9938	12.10	9.81	6.650	6.8:100	2.50	.273	1: 9.2	.592	.419	0.172	.150	None	1:5.17	—	.074	.207	.055	.024	.2225	1.04
749	.9915	12.50	9.92	.5910	6.0:100	2.61	.138	1:18.6	.670	.630	0.088	.211	None	1:7.60	—	.144	.165	.093	.023	.2225	1.07
746	.9951	12.95	10.27	.6712	6.5:100	2.99	.324	1: 9.2	.618	.600	0.118	.140	None	1:5.48	—	.106	.105	.112	.044	.2563	1.29
847	.9937	13.50	10.71	.6266	5.9:100	2.85	.275	1:10.3	.582	.504	0.139	.125	None	1:4.20	—	.309	.109	.175	.045	.2331	1.31

89	.9937	10.10	8.01	.5341	6.7-100	1.77	.207	1: 8.6	.154	.346	.087	.083	None	1: 5.22	-.60	.381	.126	.054	.016	.1477	.60
90	.9941	10.10	8.63	.6134	7.1-100	2.11	.239	1: 8.8	.318	.376	.113	.108	None	1: 4.57	-.50	.056	.126	.054	.024	.1388	.88
91	.9943	12.80	10.15	.9927	7.0-100	2.49	.253	1: 9.8	.676	.337	.112	.196	None	1: 6.06	-.80	.066	.147	.048	.027	.2243	.93
92	.9940	12.50	9.92	.6135	6.2-100	2.56	.250	1: 10.2	.639	.483	.116	.106	None	1: 5.49	-.40	.100	.179	.079	.029	.1833	1.11
93	.9940	10.30	10.71	.8170	8.1-100	3.13	.286	1: 10.6	.589	.443	.118	.149	None	1: 5.01	-.80	.214	.286	.133	.034	.3062	1.32
94	.9947	11.95	9.48	.7423	7.8-100	2.56	.233	1: 10.6	.649	.474	.110	.196	None	1: 4.63	-.80	.204	.175	.076	.027	.2884	.91
95	.9941	13.15	10.43	.6358	6.1-100	2.63	.233	1: 11.1	.654	.411	.118	.203	None	1: 5.56	-.50	.145	.163	.075	.025	.2866	1.11
96	.9929	11.85	9.40	.6130	6.8-100	2.02	.222	1: 9.1	.616	.496	.120	.156	None	1: 5.39	-.40	.045	.105	.045	.028	.2322	.81
97	.9925	11.31	11.24	.6699	5.9-100	2.67	.232	1: 11.5	.652	.431	.117	.138	None	1: 3.69	-.80	.077	.200	.062	.040	.3325	1.26
98	.9926	13.36	10.60	.6500	6.1-100	2.57	.286	1: 9.0	.519	.430	.071	.152	None	1: 5.33	-.10	.107	.119	.016	.015	.3329	1.10
99	.9947	12.30	9.76	.6785	7.0-100	2.55	.172	1: 14.8	.576	.456	.095	.231	None	1: 6.04	-.60	.093	.168	.059	.036	.2634	1.15
100	.9941	12.20	9.68	.7528	7.6-100	2.33	.240	1: 10.5	.670	.516	.123	.192	None	1: 5.45	-.60	.097	.172	.066	.026	.2706	.96

SWEET WHITE WINES.

SWEET RED WINES

a Temperature, 22° C.

c Temperature, 25.4° C.

e Temperature, 29.4° C.

DISCUSSION OF ANALYTICAL DATA.

In all old wine-producing countries the composition of wines has been determined by analysis so definitely that it has been possible to adopt standards which are of great value in judging of the purity of wines from those countries. In the United States much less attention has been given to this matter, and the examinations made, with few exceptions, have been far from complete.

With a view to throwing light upon this subject, the Bureau of Chemistry compiled the available analyses of American wines and published them.^a The number of complete determinations was so small, however, that the compilation does not by any means serve the purpose for which it was intended. The analyses in the accompanying table are therefore of special interest in so far as they afford additional data for the determination of standards.

It is not to be expected that requirements which have been fixed for European wines will be met in all respects by those of American manufacture. At the same time, a large number of the samples described in the foregoing tables do conform to European standards, and it is probable that American standards will not differ widely from those of other wine-producing countries. Again, it would appear that the methods of wine making in this country have changed during the last few years sufficiently to have material influence on the composition of the product. This is especially true in the percentage of volatile acids, which is decidedly lower in the analyses published herewith than in earlier ones, which are given in the compilation referred to above.

The limits of composition and the ratios which have been adopted in European countries for interpreting analytical results in judging the purity of wines are given in Bulletin 59, together with a discussion of American wines in the same connection. This material is not repeated here, except in so far as it is necessary for the discussion of the analyses included in this report.

ALCOHOL.

The percentage of alcohol in the samples of dry wines conforms to the standards that have been adopted for European wines. The ratio of alcohol to extract and the sum of the alcohol expressed in grams per liter and the total acidity expressed as grams per 100 cc conform to the ratios adopted in France for wines to which neither alcohol nor water has been added. Among the sweet wines three samples had not been sufficiently fortified to stop fermentation.

GLYCEROL.

As is stated in Bulletin 59, it is probable that the glycerol-alcohol ratio of American wines is somewhat lower than that of European

^aThe Composition of American Wines. By W. D. Bigelow. Bulletin No. 59, Bureau of Chemistry, U. S. Dept. of Agriculture, 1900.

wines. The number of European wines which fall below the minimum limit of 7 parts of glycerol to 100 of alcohol is so large that it is commonly admitted that this limit is too high and should be reduced to 6 to 100. Even this ratio, however, is much higher than the majority of American wines whose composition is given in Bulletin 59. The glycerol-alcohol ratio of the wines included in this report is considerably higher than the earlier analyses given in that bulletin. Of the 38 samples of dry wine included, 29 contain more than 6 grams of glycerol per 100 grams of alcohol. The minimum ratio was 5.7 to 100. Whether this increase in the glycerol ratio above that of the earlier analyses is due to improved methods of fermentation or not, it would appear that this ratio need be little, if any, lower than that adopted by other wine-producing countries. It is noticeable that the glycerol-alcohol ratio of all the samples examined is relatively low; and while, as stated above, it is superior in almost all cases to 6 to 100, it is in most samples only slightly in excess of that ratio.

From the varying glycerol content of the sweet wines examined it would appear that a great difference exists in the practice of different vineyards regarding the extent of fermentation before fortification.

EXTRACT.

All the samples examined comply with European standards in percentage of extract. In the case of red wines it would appear that a higher minimum limit may be adopted for American wines than that fixed in other countries. The "extract rest" (extract less total acids) is also similar to that of European wines, and the undetermined extract (extract less the sum of the glycerol, ash, sugars, and fixed acids) appears to be the same in the white wines examined as in European wines. Like the extract it is somewhat higher, however, in the red wines, varying from 0.60 to 1.37 grams per 100 cc.

ACIDITY.

The percentage of acids in the samples examined conforms to the standards of wine-producing countries. All red dry wines examined contained over 0.45 gram of acids per 100 cc, and in only one instance was it less than 0.51 gram. Of the 15 samples of dry white wine examined 1 contained less than 0.45 gram, and 3 less than 0.50 gram of total acids (calculated as tartaric) per 100 cc. No samples were found to contain more than 0.90 gram of total acid per 100 cc, with the exception of 2 which were also high in volatile acids. Of the 38 samples of dry wine examined 28 contained between 0.50 and 0.70 gram of total acids, calculated as tartaric, per 100 cc. Of the 6 samples with more than 0.70 gram of total acids per 100 cc, 5 contained an excessive amount of volatile acids.

As has been said, the percentage of volatile acids in these samples is materially lower than in the analyses included in Bulletin 59. It

would appear that great progress has been made in the methods of fermentation employed. Of the 15 samples of white wine examined for this report 3 are in excess of the European maximum limit for volatile acids (0.12 gram per 100 cc). One of these is only slightly in excess, while the other two are entirely too high in volatile acids. Of the 23 samples of red wine examined 4 are in excess of the European limit for sound wines (0.16 gram per 100 cc), while 12 contain less than 0.12 gram per 100 cc, and hence are considered as entirely normal. For the present, therefore, it would appear that a slightly higher percentage of volatile acids should be allowed in American wines than is demanded in European wine-producing countries. A large number of the wines examined fall below the limit at which the European wine would be condemned, but contain more volatile acid than is considered normal for European wines. Of the 38 samples of dry wine examined 4 contain more than 1 part of volatile acid to 4 parts of total acid, and 9 contain more than 1 part of volatile acid to 5 parts of total acid.

Several of the sweet wines examined contain an excessive amount of volatile acids.

SUGARS.

The percentage of sugar found in the dry wines included in this report is materially lower than in the analysis published in Bulletin 59. This fact confirms the inference drawn from the decrease of volatile acids and increase of glycerol that the methods of fermentation have been improved since the wines included in the earlier analyses were made. No evidence was found in any case of the addition of either cane sugar or glucose in the preparation of dry wines.

POTASSIUM SULPHATE.

The largest amount of potassium sulphate found was 0.13 gram per 100 cc. There was no indication of plastering in any case.

SULPHUROUS ACID.

Of the 15 samples of white wine examined 5 exceed the Swiss limit of 8 mg of total sulphurous acid per 100 cc, and 3 of these 5 samples exceed the Bavarian limit for free sulphurous acid (2 mg per 100 cc).

PRESERVATIVES AND COLORING MATTER.

Of the 38 samples of dry wine examined one was preserved with benzoic acid. No other preservative was detected. Where the quantity of the sample permitted, 100 cc were employed for the detection of boric acid. In all but one of the samples in which this determination was made boric acid was found to be present in amounts varying from a slight trace to a sufficient percentage to give a good, heavy reaction. The percentage of boric acid was not estimated in any instance. One sample was colored with a coal-tar derivative.

THE MANUFACTURE OF WINE IN CALIFORNIA.

By HENRY LACHMAN.

Of San Francisco, Cal.

With the advancement the United States is making commercially and the improvement of her manufactured goods, especially steel and iron, due to their being equal to if not excelling European manufactures, she is bound to make the same inroads into the world's trade with her farm products by following the same lines and catering to the European taste by the adoption of European standards.

There is no question that the wine produced in California comes nearer to the European product than that produced in any other country in the New World. We are convinced of this by the action of the jury at the Paris Exposition in putting out of competition all California wines bearing labels designating their types, which the French considered as imitations, although they had allowed these same labeled wines to enter into competition for the last twenty years and until the exposition of 1900. The writer's earliest recollection of medals being awarded for California wines is the Vienna Exposition of 1876.

Although there has been wine raising in California for local consumption as far back as 1860, shipments to Eastern points were not considered until about 1870, when California wines received recognition. In former years California had but few varieties of grapes to work with. The mission was the principal wine grape. It produces fine sweet wine, but poor red wine, the chief objections being its strong tannin and earthy taste, due not so much to the ground as to its not being suited for light dry wines.

After the planting of foreign varieties, such as zinfandels, mataros, carignans, etc., the production of the finer types of red wines was possible, and in the last eight years rapid progress has been made in the manufacture and maturing of wines, wine making having been conducted on more scientific lines.

Owing to the devastation wrought by the phylloxera in California, which in a few years will have cleared out the entire old vineyard area of the State, it is to be hoped that the vineyards will be replanted with the varieties for which they are best adapted. Elevation, drainage, sun exposure, and moisture should be taken into consideration, and

vines set out according to the nature of the roots they throw out. Low lands with boggy spots and flat areas exposed to frost should be left unplanted. When trees are planted through a vineyard the vines often produce more heavily, the grapes being protected from the hot winds as well as frost. The question of fertilizers, which has been overlooked heretofore, will also have to be considered. All this requires considerable time and money. The question that confronts the California wine maker to-day is whether the returns will justify his going to all this trouble and expense.

The chances of loss in the cultivation of the vines and the raising of crops are much greater than on any other product. The vintner has many things to contend with. He may select the wrong location. In planting, he might not choose the right varieties. During the planting, he may strike a bad season and be delayed a year in the setting out of his vineyard. When his vineyard is in bearing, there is the danger of frost. If he escapes the frost he is likely to suffer damage by sunburn. He has also climatic conditions to contend with, such as prolonged cold spells, which are likely to produce coulure, or dropping of the grapes from the bunches; and there is the danger of mildew during a foggy spell just before the vintage. Besides all this, constant care is required in the cultivation of the vines; and when the grapes are finally ripe and ready to be gathered, the wine maker's hard work begins.

HARVESTING.

In California wine making begins in Fresno County, the principal sweet-wine district, from August 15 to 20. The red varieties are the first to ripen, and consist of zinfandels, mataros, and carignans. These grapes are not sweet wine varieties and carry a high percentage of acid. Still, owing to the dryness of the soil and the high temperature in which they are grown, they run very high in sugar, which somewhat reduces their free acid. To make a desirable port it is necessary to blend the wine made from these grapes, with other varieties, such as mission, Rose of Peru, emperor, and bouschet. The tressaut, the principal port-wine grape, ripens about September 20, and is blended with this wine later.

Following the red grapes come the burgers, feher zagas, malagas, and sultanas, which bring the harvesting up to about the middle of September, after which the second crop of malaga matures. The second crop of muscats arrives in September and October; the first crop of muscats is generally used for raisins.

Grapes are crushed until about October 20. Third crops have been harvested as late as Christmas, when there have been long seasons and no steady rains. Sometimes the third crops mature fully, containing as much as 24% sugar. In Fresno County, as a rule, the vines are not staked, and the yield is from 6 to 10 tons to the acre.

Before the grapes are gathered they are tested for their saccharine strength, the usual method being to pick a few bunches from different vines, drop them into an empty cloth flour bag, and squeeze the juice through into a cylindrical vessel. Oftentimes farmers put a plug into a piece of hose and drop the saccharometer into this makeshift. Tin cylinders are most generally used, being less breakable than glass.

After the grapes have been tested for sugar (the standard being not less than 24° Balling for sweet wines) gangs of men—Chinese, Indians, Servians—boys, and often women, proceed to pick the bunches, collecting them in boxes holding from 50 to 60 pounds. The price paid the gatherer is based on the size of the crop and upon the season. Should a man be able to fill a box from two vines (which is very good picking) he is paid at the rate of \$1 per ton. Should the crop be short, and it takes more vines to fill a box, the price is often raised as high as \$2 per ton. At this rate the pickers average from \$1.50 to \$2 per day. They board themselves, generally traveling from place to place in wagons with their wives and children. Each picker is given a number, which he marks on each box that he gathers. Most of the vineyards are set out in rows 8 feet apart, 1 row missing in every 20, which gives avenues about 16 feet wide through which the wagons pass and gather the boxes of grapes from the pickers. As each picker delivers a box to the driver he is given a tag in exchange. These tags are turned into the "boss" contractor, or superintendent who works the gangs, and the amount is paid. The pickers have to supply their own blankets and pay 50 cents daily for their meals, sleeping quarters being provided.

If grapes are shipped to a winery at a distant point, they are hauled to the depot and shipped in boxes; or often, in the Fresno district, where the varieties are thickskinned, such as muscats, the grapes are dumped from the boxes into the cars, frequently on flat cars, in the same manner as gravel is loaded. The grapes generally reach their destination within forty-eight hours after picking. Should it take longer, and the grapes arrive in a damaged condition, they can only be used for brandy making.

In the bay counties (the dry-wine district) the vintage generally begins between September 5 and 10, and deliveries continue until about the middle of October. There is very seldom any crushing done in November in the dry-wine districts, excepting possibly some second-crop grapes or mission varieties. The first dry-wine grape to be delivered is the zinfandel, after which, about September 20, come the burgundies. The mataros and carignans arrive from the beginning to the middle of October.

The first dry-wine white grape delivered is usually the chasselas. The rieslings follow, then the sauvignons, and the burgers last. In the bay counties the grapes are gathered in the same manner as in the sweet-wine districts, but the deliveries are generally made in wagons

direct to the wineries. There are some Indians (who travel with their squaws and children) and Chinese among the grape gatherers, but the majority of the laborers are white. Usually the people in the immediate neighborhood participate, as do those who have preempted land in the mountainous districts, who travel down to the farming sections in harvesting time, beginning with the picking of cherries, following with the peaches and pears, then the hops and prunes, and lastly the grapes, which affords them steady employment from June to about November. They earn from \$1.50 to \$2 each per day, which is about the same as the pay in Fresno County, and generally sleep in tents, camping out.

Table grapes are gathered under somewhat different conditions, the grapes being culled and perfect bunches selected. These people are known as packers and not pickers, the pickers delivering to the packers. Table grapes are not profitable for making wine, on account of their thick skin and little juice. While wine grapes produce 150 gallons to the ton, table grapes will produce only about 80 to 90, and the juice is not so desirable on account of its lack of acid. The wine produced from table grapes is mostly used for brandy making.

VARIETIES OF CALIFORNIA WINE GRAPES.

The following is a list of the various varieties of grapes grown in California, and the average yield per acre of each:

SWEET-WINE GRAPES.

Trousseau	Grown chiefly on flat land and yield 6 to 10 tons to the acre.
Sultana.....	
Palamino	
Thomson's Seedling	
Muscat of Alexandria	
Sweet Water	
Feher Zagas	
Malaga	
Emperor	

Dry-wine varieties grown in sweet-wine districts and used in the manufacture of sweet wines.

Zinfandel	Yield from 6 to 10 tons per acre.
Mataro	
Carignan	
Burger	

DRY-WINE GRAPES.

Red grapes.

Zinfandel	Yield 4 to 6 tons in the valley; 2 to 4 tons on the hills.
Mataro	
Grenache	
Charbono	

Cabernet Franc	Yield 2 to 3 tons per acre in the valley; 1 to 2 tons per acre on the hills.
Cabernet Sauvignon	
Beclan	
Merlot	
Gamay	
Alicante Bouschet	
Petite Bouschet	
Petite Syrah	
Verdot	
San Macaire	
Mondeuse	Yield 3 to 5 tons in the valley; 2 to 3½ tons on the hills.
Muenier	
Barbera, Tenat	
Chauche Noir	

White grapes.

Golden Chasselas	Yield 4 tons per acre in the valley; 2½ tons per acre on the hills.
Gutedel	
Johannisberg Riesling	
Franken Riesling	
Gray Riesling	
Traminer	Yield 3 to 3½ tons in the valley; 1½ to 2 tons on the hills.
Sauvignon Vert	
Sauvignon Blanc	
Semillon	
Muscat de Bordelais	
Folle Blanche	Yield 4 tons in the valley; 2 tons on the hills.
Colombar	
Burgers	
Verdal	Yield 8 to 12 tons in the valley; 5 to 8 tons on the hills
Green Hungarian	

RED GRAPES USED FOR WHITE WINES.

Mission	Yield 4 to 6 tons per acre in the valley; 3 to 4 tons per acre on the hills.
Malvoise	
Black Pinot	

TABLE GRAPES USED IN WINE MAKING.

Rose of Peru	Yield 4 to 6 tons per acre in the valley; 3 to 4 tons per acre on the hills.
Black Hamburg	
Cornichon	
Tokay	
Emperor	

There are no second crops from the white varieties. There is a second crop from the zinfandels, and occasionally from the mataros if the season is long and the growth heavy.

FERMENTATION.

Grapes are handled by raising them on an elevator to a position above the fermenting tanks, where they are dumped into a crusher, which is oftentimes located above the fermenting tanks. They are

then crushed between corrugated rollers which are set so as not to crush the seeds, only breaking the skins. After this they pass into the stemmer and the stems are removed. The seeds, skins, pulp, and juice are then run along chutes to the fermenting tanks. (See Pl. II, fig. 2.) Should there be any varieties where the stems have become dry, the stemmer is taken off and stems and all allowed to pass into the fermenting tanks, so that the tannin can be drawn from the stems. As a rule grapes are fermented without the stems in California.

Immediately after the fermenting tanks are filled about two-thirds full the must is tested for sugar, which should not go under 22°, the thermometer generally registering about 70°. Should the grapes after crushing remain over a cold night it sometimes takes two days before fermentation starts. When the temperature of the must is not over 80° there is no trouble in drying it out. At 90° fermentation always stops. The temperature is taken three times a day, and the sugar calculated from the density of the must.

The first day the must loses about 6° of sugar, 6° the second day, and the same amount on the third. Four degrees is lost on the fourth day, and from the fifth to the seventh day the sugar practically disappears. As soon as the sugar is gone the juice is drawn off the pomace.

Uniformly ripened bunches generally go through fermentation without any trouble, coming out perfectly dry, while those with green or half-dried grapes have a spasmodic fermentation, registering a drop in sugar one day and no decrease another day, finishing generally with the gas leaving the must during the time the temperature is over 90°. In this condition there is often from 1° to 4° of sugar left. Such wine goes rapidly into lactic acid and is fit only for distilling, and will spoil any sound material that is blended with it. This mistake is too often made. When a wine maker can see that it is to his advantage to hold his loss to a minimum, and not try to cover his mistakes, he will be the gainer. Merchants are distributors, and can sell only what they have to offer or what is on the market. Ever gallon of poor wine loses a consumer, and it takes time to remove prejudice. There is no manufacturing business that can give satisfaction where inferior material is worked in. Assorting is carried on with all California fruits to-day, prunes being graded according to size, apples on their size and appearance, pears and peaches the same, and oranges for their color, size, and quality. When the wine maker realizes that the control of fermentation is the vital point in wine making, he will have no trouble in producing an article that will take care of itself, figuratively speaking, and it will give no trouble to the dealer in handling and preparing it for market.

California grapes ripen with all the essential elements for producing fine grades of wine. The percentage of alcohol, extract, tannin, gly-

cerol, and acid in the wines proves them equal to the best. From an analytical point they lack nothing, and are within the standards adopted by France and Germany and by the last congress of wine growers at Paris in 1900.

The care of wines is a constant study and requires incessant thought and observation. A lazy or indifferent man should never undertake their care. Like a child, they must be nursed and watched. They do not always act alike, and for this reason they should be examined not less than once a week. There are no standard rules to follow. Wines often get tired from overwork; that is, handling them too frequently. They also get sick from being overheated. They are affected by changes in temperature. The temperature at which white wines are stored should not go over 60° or under 50°; red wines should never go under 60° or over 70°. Wines need cleaning, and casks should be racked and given a suit of clean clothes, by being drawn into freshly cleaned packages. By "clean" we mean scrupulously clean. In cleaning a cask that has a manhole, the cellarman should get inside with hose and scrubbing brush and thoroughly cleanse it with soda and hot water if it has been empty for any length of time, and then rinse with cold water until the water runs out clean and sweet. The cask should then become thoroughly dry before filling with wine. All tools used in this operation should also be thoroughly clean.

It is always best to use the same packages for the same character of wine. Superior Burgundy types should always be stored in cooperage that has previously contained wine of the same kind. Good wines stored in cooperage that has previously contained inferior grades are bound to deteriorate, while poor goods stored in packages that have held good wines might spoil them for further use for finer grades. Red wines should never be stored in cooperage that has contained white wines, and vice versa. A new wine, especially a sweet wine, port or sherry type, is much improved by being stored in a package that has previously contained old similar wine. To prevent a package from souring it should be sulphured not less than once a month, using about 3-inch sulphur wicks for the purpose.

The size of the fermenting tanks depends upon the size of the winery. There is a discussion as to whether the large fermenting tanks give more satisfactory results than the small ones. The writer's experience indicates that no fermenting tank should have over 5-foot staves, 12 feet in diameter, with a capacity of about 5,000 gallons.

In order to keep the pomace cool, punching rods are used to submerge it beneath the juice, the pomace always rising to the top of the tank. Frequently juice is pumped over the pomace once a day to keep the mass constantly fermenting and at the same time extract the tannin and color from the skins and seeds. The main object is to keep

the mass fermenting until the wine has become thoroughly dry. As soon as the carbonic-acid gas has left the wine it is drawn off into closed tanks or casks for storing. These tanks, previous to filling, should be thoroughly cleaned and sulphured. The pomace should then be handled at once, as it sours immediately when it comes in contact with the air, beginning at the top and working downward. Should the top of the pomace pile cake, it should be skimmed at once and thrown away. If the pomace is to be pressed it should be done within twenty-four hours after the juice has left it.

To produce a piquette, or wash for brandy making, it should be made strong enough to pay for distilling—that is, from 5 to 7 per cent in alcohol. This is generally accomplished by passing water into a tank filled with pomace, through a pipe feeding from the bottom, the overflow from this tank passing off the top and entering a second tank filled with pomace at the bottom. The overflow from the second tank is then conducted into a third tank filled with pomace, in the same manner. The wash from the first tank generally goes between 2 and 3 per cent alcohol; from the second, 3 to $4\frac{1}{2}$ per cent, and from the last about 5 to 7 per cent. After the pomace has been washed twice it is thrown out and sold to the cream-of-tartar works for the manufacture of cream of tartar, the price paid being from \$0.75 to about \$1.25 per ton.

Should the fermentation cease—generally caused, as stated before, by too high a temperature and an excess of sugar in the grape—fresh must from grapes that are not so sweet should be pumped over the “stuck” wine. This should be done within six hours after the tank has ceased working, and fresh juice should be worked over it until fermentation is again started.

White grapes as a rule are crushed without stemming. Six to ten hours is sufficient time to allow the must to settle from the pomace, when the juice is drawn off. The pomace is then put through the press to produce a “press” wine, after which it goes through the same process of washing as the red pomace.

When first drawn off, the fresh juice is pumped into small oak casks, about two-thirds full, and allowed to ferment. These casks are closed. (See Pl. II, fig. 1.) The fermentation is watched closely each day. During the first five or six days of fermentation a heavy scum forms on top. This is drawn off and fresh juice added to take its place. After the sixth day, the violent fermentation having ceased, the casks are filled close to the bung, and a fermenting bung (which is generally a piece of block-tin pipe in the form of a gooseneck) is attached to the cask, through which the gas passes into a bottle of water. The Italians often use a bag of sand, which they place over the bunghole. The object is to allow the gas to escape, as otherwise the high pressure would burst the casks.



FIG. 1.—BUNCH OF GRAPES.



FIG. 2.—VIEW OF VALLEY TOWARD CALISTOGA AND MOUNT ST. HELENA FROM GREYSTONE WINERY.



FIG. 1.—STORAGE OF NEW WINES ON SECOND FLOOR, GREYSTONE WINERY.



FIG. 2.—FERMENTING ROOM, 400 FEET LONG, THIRD FLOOR, GREYSTONE WINERY.

The control of temperature in both the fermenting and storage cellars is most essential. In the fermenting room between 70° and 80° is quite safe. In the cellar new wines can safely be stored the first year at from 60° to 70° temperature. After the first year 60° F. is the standard temperature for storing wines. The ventilation in the cellar should also be perfect, and there should be no drafts. It has often been noticed that wines stored in cooperage beside a window or door are more backward than those protected and away from openings. Light in the cellar is also objectionable, as it has a tendency to change the color of wine.

After the wine has become dry it begins to precipitate or clear itself. This depends greatly on the place where it is stored, and also on the condition of the weather. In very cold and clear weather wine precipitates much faster. Before the lees begin to rise the wine is drawn off the sediment into thoroughly cleaned cooperage. The first racking takes place from six to ten weeks after the wine is made, depending upon the condition of the wine. The next racking occurs from February to April. The wines are again racked before the hot weather begins, which causes the sediment to rise. All new wines should be racked about four times a year, the last racking taking place before the vintage, in August or September. Old wines should always be removed previous to the making of the new, and if possible stored in a separate building. If this is not done, it will often be found that the wines take on a musty taste, caused by the decomposition of the old sediment brought on by the action of the new ferment germs.

In California, where wines are handled on a large scale, much larger cooperage is used than in Europe, and of somewhat different style. The fermenting tanks range from 2,500 to 10,000 gallons, and in some places as high as 25,000 gallons. For storage, the packages range from 5,000 to 50,000 gallons, from 10 to 20 feet in diameter, made up of redwood, with staves 2 to 3 inches thick and 10 to 20 feet high. This style of package is used mostly at wineries where wines are stored for the first year, and where 1,000 to 15,000 tons of grapes are handled during the season. In these same wineries wines are stored in cooperage of 2,000 to 3,000 gallons capacity.

New wines are generally held intact until the second racking in spring, when they are assorted and blended. Wines that show no improvement with age, although not spoiled, are used for the production of brandy for the market, along with fresh juice. After the spring fermentation, should there be any, wines that have remained in the country about six months are shipped to San Francisco, where the blending for the various markets is performed. For England a Burgundy type is blended; for China and Japan, a Bordeaux type. New Orleans uses a wine more on the line of "vin ordinaire." New York takes various Burgundy types and light clarets, as well as strong, stringent wines for the Italians.

For blending these different wines oak cooperage is used up to \$0,000 gallons capacity, but principally 25,000-gallon oak tanks are employed. A "blender," or cylinder, 10 feet long and 3 feet in diameter is used, into which the wines enter through ten 2-inch hose and whose outlet is one 4-inch hose, which connects with a centrifugal pump with a capacity of 20,000 gallons an hour. In this way, after making four blends of 250,000 gallons each, 1,000,000 gallons can be reblended.

After blending, the wines are allowed to rest for about ninety days, when they are put through a filter machine and drawn down into oval casks of from 1,000 to 4,000 gallons capacity.

CLARIFICATION.

Gelatin and the whites of fresh eggs are used in the clarifying of red wines. From one-half to 1 pound of this material is used to 1,000 gallons, according to the age and clearness of the wine. When using the whites of fresh eggs, all the way from half a dozen to a dozen are used to 100 gallons of the wine to be fined, 1 dozen being the maximum.

The fining material is thoroughly soaked in water and then beaten to a froth with a rattan broom. It is then poured into a tub of about 20 gallons capacity, containing from 5 to 10 gallons of the wine to be fined, and the mass again beaten till it froths. After this it is poured into the cask to be fined and thoroughly worked through by agitating the wine with a pump for one to three hours, depending upon the size of the cask.

For clarifying white wines Russian isinglass is used. A solution of this material is made consisting of $7\frac{1}{2}$ pounds of the dry Russian isinglass (gelatin) to 75 gallons of water, the dry isinglass having first been soaked for twenty-four hours in water until it becomes soft and pliable, after which it is made into a homogeneous mass by grinding, and then worked through a sieve until it becomes thoroughly dissolved. In this dissolved form one-half gallon is used to each 1,000 gallons of white wine. It is beaten to a froth, the same as the gelatin first mentioned and other fining matters, before being added to the wine.

After the addition of fining matter the cooperage is filled to the bung. The package must be filled to the bung again the next morning, as the wine contracts, leaving a space. The casks must be filled up for about three days in succession before the shrinkage will cease, and regularly once a week thereafter, until the wine is drawn off the fining, as packages often fail to come clear after fining if filling up has been neglected. This has been proven by allowing one or two packages to remain without filling up.

It is also highly necessary that the bung fit perfectly into the bung-hole. Often in old cellars, where the bungs are frequently removed, the bunghole is "out of round" and the bungs much worn, forming a shoulder. The cost of a bung is not at the utmost over 5 cents, while the damage to a cask of wine of 2,000 gallons capacity, at 5 cents per gallon, would amount to \$100. It is oversight in these small matters that proves very expensive in cellar work.

The wine is left on fining all the way from twenty to thirty days. If at the end of this period it does not come clear, it is drawn off and reclarified. Too much filtering flattens wine and injures the flavor. Heavy sulphuring of casks often precipitates color in the red wines.

About sixty days after wines have been blended a thorough analysis is made. Sweet wines, when new and properly made, average 0.052 volatile acid; at 0.100 they stand condemned. Wines of the sherry type should not go over 0.50 free acid, and are condemned at 0.100 volatile acid. Clarets for export should not exceed 0.12 volatile acid; at 0.14 they are considered doubtful, and at 0.16 they are condemned. The average alcohol of red wines produced in California is 12.25 and of white wines 11.5 per cent. Some white wines made from burgers, green hungarians, and other light varieties run as low as 10 per cent and are similar to the German Rhine wines. Wines of the sauterne type go from 13 to 14.5 per cent in alcohol. From analyses it is seen that the standard white wines will pass the laboratory of any country in which standards are adopted. Unfortunately there are no such regulations in the United States.

A law protecting trade-marks and labels, convicting persons refilling bottles or imitating brands with an attempt to deceive, and the confiscation of adulterated goods is the only protection to the American wine grower. There is in California as much grape country upon which suitable wine can be raised as the entire wine-producing area of France. Farmers with a variety of crops—prunes, peaches, and cereals—have often stated that a vineyard, on an average five-year basis, paid better than any other crop; that is, when they have sold their grapes at the ruling price and have not speculated on the wine market.

Wines should never be put on the market unless they are perfectly clear; that is, they should hold clear and show brilliant before a candle. Only wines not less than eighteen months old that have been properly made can stand this test. This age refers to bulk goods only, and such wine is too young for bottling.

TASTING.

Some wines will not precipitate and clear themselves, because they still contain a slight amount of gas. To determine whether there is any gas in a wine, take a mouthful and slowly move the tongue through

the wine to the palate, twirling it at the same time. A prickly sensation at the tip of the tongue denotes the presence of carbonic-acid gas. It has the same effect, but not so strong, as carbonated waters.

Should the wine be perfectly dry, but with a trace of gas, it should be aerated by running it through a faucet and bringing it in contact with the air. Should there be any sweetness discernible to the taste, it is not advisable to bring the wine in contact with the air, but to hold the gas in it; and when racking the casks should not be sulphured, as the sulphur is likely to check the fermentation. The casks should be filled to the bung not less than twice a week until the wine becomes thoroughly dry. The saccharometer in common use will register at zero, although a little sweetness is still discernible to the tongue. Consequently one can not rely upon that instrument as to a wine being dry.

In tasting there is the "first taste," the "second taste," and the "good-bye," after the wine has left the mouth. On the "first taste," the body or extract is detected; on the "second taste," the acids, free and acetic, and on the "good-bye," the tannin, flavor, and defects are caught. The musty taste is not noticed until fully half a minute after the mouth has dried.

The most difficult branch in the handling of wine is the art of blending, which should be assisted by chemical analysis, as it is the only check showing that the taster is correct in his judgment. A taster should never attempt to judge wines if he is out of condition. An experienced taster should be able to tell the alcohol, extract, and free and volatile acids, to detect any blemish, and tell whether a wine has been corrected by the use of lime, chalk, or salt. This requires constant practice. There are so many tests to make on wines that comparatively few can be made in the laboratory if each sample is to be analyzed for all its ingredients.

Many varieties of grapes are discernible by smell, but mostly by the flavor on the tongue. Grapes like cabernet and semillon, with their too pronounced flavors when new, are generally used for blending for finer grades, and do not develop until after the second or third year.

BOTTLING.

The bottling of wines is the last handling. It is the only proper method of distributing and the least considered, although it is the only way of holding the identity of brands, which, owing to the uncertainty of protection, has received no encouragement.

There is more expense in putting wine on the market in glass than in any other form, the cost of the cover and handling being a considerable percentage of the value of the product. It is safe to say that of the large amount of wine put up in bottle much is too young. No red wine should be bottled under three years and no white wine under

four, and not then until they are thoroughly matured and perfectly brilliant. This is usually determined by a candle test; that is, by holding a candle behind a glass of wine and noting whether the flame burns brilliant and that the little red tip on the end of the wick is plainly discernible through the glass. Another method pursued is to place the finger in front of the candle light, behind the glass. If the outline of the finger is sharply seen through the wine without any shadow it can be safely bottled.

The only thoroughly safe way is to make a test by bottling two or three bottles and locating them in different places: exposing one to light, another to heat, and the third to draft. Should the wine show no change and hold clear for a week or ten days, it is safe to bottle. No general rule, however, can be made for all wines. Some mature sooner than others. Some take three years; others five. A great many go backward after three years if not properly made. California dry wines that have been bottled for twenty years have been found to be perfect. A great many bottled wines that are 10 years old are being shipped out of California to-day.

The bottles should be perfectly clean and thoroughly dried before filling, and the corks should be of the best quality. In bottling, wines should be kept away from the air. The best way is to fill direct from the cask through a faucet.

In selecting bottling wines, the taste as well as the eye must be considered. Wines should be acclimated to the cellars in which they are stored before they are bottled, which takes fully six months; and two rackings in their new home are necessary before bottling should be attempted.

VARIETIES OF WINES PRODUCED IN CALIFORNIA.

Owing to the very many foreign varieties of grapes grown in California, and the different soils, wines similar to those of any country may be produced.

In the vineyards away from the coast, protected from the ocean winds by two mountain ranges, where the air is filtered through pine and redwood forests, and tempered by fogs, similar light wines to those of Germany and France may be made. The same varieties of grapes that the Rhine wine makers and the French produce their wines from are grown, and wines are manufactured on the same lines.

In the southern part of the State, where the land is sandy and the vineyards are far from the coast and not reached by ocean fogs and winds, the same type of wine as is made in Spain and Portugal is produced, and the process of manufacture is identically the same. California wines are never strengthened by blending with those of another country.

White grapes grown on flat lands with heavy soils produce a heavy

growth and give quantity, while rolling lands produce a finer grade, and a hilly or mountainous country gives the higher flavors. The white wines made from the grapes grown in Livermore Valley on gravel or lime formation, the bed rock being not over 5 to 8 feet from the surface, have a different character altogether from the white wines from our other dry-wine districts. A blend of two-fifths semillon, two-fifths sauvignon blanc, and one-fifth muscat de bordelais from this section produces a sauterne type similar to that turned out by French bottlers. The red grapes grown in Livermore produce an altogether different type of red wine from those produced in other districts.

PORt TYPE.

Wines of the port type are manufactured on the same lines followed in southern Europe; that is, by fermenting the juice down to about 6° to 10° sugar and fortifying it up to 20 per cent alcohol. A great many manufacturers try to keep their alcohol below this number, which is a mistake. Any dealer who wants to age a wine of this kind that is over 3 years should never store it away under 22 per cent in alcohol.

SHERRY TYPE.

Wines of the sherry type are made by fermenting white must down to about 4° of sugar and fortifying it up to about 20 to 21 per cent alcohol. It is then baked by the sun in cooperage ranging from 50 to 160 gallons in a building whose roof and the side most exposed to the morning sun are glass. The temperature in this style of a sherry house goes as high as 140° F. and is kept steady by the assistance of a furnace at night. Another method of baking the wine is to store it in a room built for the purpose, generally of brick, heated either by steam or hot air. In the latter process it is always advisable to reach 140° at once, and when drawn off it should be cooled to about 60°.

Should these wines be held from five to ten years they will have the same flavor as is found in the Spanish article. No artificial flavor can ever equal the flavor of age. California is more backward in sherry types than any other wines produced in the State, on account of not allowing them sufficient time to develop their flavor.

MALAGA TYPE.

This wine is produced by taking a very sweet grape on the style of the trousseau, oftentimes boiling the must, thus producing a very heavy bodied wine. It is then either baked in the sun or heated in the oven for a time.

TOKAY TYPE.

These wines are produced by allowing the grapes to shrivel on the vines, becoming partly raisin, and fortifying up to 20 per cent alcohol, the same as with the sherry types. The grapes selected contain a little more acid and are mostly of the museat varieties blended.

SPARKLING WINES.

Champagne types can be produced in California, although fully \$1,000,000 has been lost in experimenting. This is due to the fact that the manufacturer did not select his grapes nor his wines for the purpose, usually trying to make it out of old wine, or wines that were between 12.5 and 13.5 per cent alcohol, which was too high.

In the manufacture of the champagne type, the grapes should be specially selected and the wine carefully made. No cuvée should be bottled that goes over 10 per cent in alcohol. We raise a pinot, a red grape from which red wine should never be made, a bulger whose acid is too pronounced by itself, a green hungarian, and a verdal, besides other varieties that ripen at between 18° and 20° sugar, which are bound to make a satisfactory champagne type if properly handled. High alcohol wines continue to throw a deposit for too long a time, and by the time they are ready to be disgorged they have taken on a hard taste.

Labor is also a handicap in the manufacture of this article. There are no mechanical contrivances for handling each bottle. The riddling, disgorging, and recorking are altogether dependent upon hand labor, and in this country the men are paid about twice as much as those in Europe and are not as skilled in this branch. The average cellar man in California is paid at the rate of \$2 per day, or between \$50 and \$60 per month. Experienced help often receives as high as \$3 a day. Wine superintendents and wine makers average \$100 per month.

MARKETING THE WINES.

This is one of the most important branches in the handling of wine. The wine industry can be divided into six branches: First, the nursery for rooting vines; second, the planting of vines and raising of grapes; third, the winery; fourth, the brokerage end or the middleman, who acts between the producer and the dealer; fifth, the dealer, who stores, blends, and matures the wine; and, sixth, the retailer, who sells to the consumer direct.

According to the official statistics,^a the wine crops of California for 1892 to 1900, inclusive, were as follows:

	Gallons.		Gallons.
1892.....	15,000,000	1897.....	34,000,000
1893.....	27,700,000	1898.....	18,529,000
1894.....	16,000,000	1899.....	23,433,000
1895.....	14,000,000	1900.....	23,677,560
1896.....	13,500,000		

^aTaken from the California Fruit Grower, November 30, 1901.

If a dealer is going to run a brand, it is most necessary that he have a sufficient uniform supply. This can only be assured by setting aside large blends of wine of the same type, and continuing it from year to year by careful selection and blending. The future of the wine business lies altogether in the marketing. It can be safely stated that California wines have never been fully understood nor correctly handled. The adoption of a standard again comes into play. If wines are assorted and classified according to their virtues, as is done in Europe with wines and other merchandise, the opportunities for improvement in the business will continue. Until this is done the California grape grower and wine maker will be working at a disadvantage.

In the new era that is about to open with the replanting of vineyards, encouraged by the advanced prices that have made grape growing again profitable, all these difficulties can be overcome.



93.70

93.90

90.0

94.30

94.35

920.35

920.70

73

